

Pollution Abatement and Control Expenditures, 1972-81

REAL expenditures for pollution abatement and control (PAC) declined 1 percent in 1981 (chart 4).¹ The revised estimate for 1980 also showed a decline. In 1972-79, expenditures had increased each year, at an average annual rate of 5½ percent. Pollution abatement (PA) expenditures, the largest category of PAC expenditures, declined (in 1972 dollars) 1 percent in 1981; regulation and monitoring increased less than 1 percent; and research and development declined 3 percent.

This article first presents and discusses PAC estimates for recent years: real expenditures and prices of PAC goods and services in 1981, the limited data on expenditures available for 1982, and revisions in PAC estimates for 1978-80. Next, it summarizes trends for 1972-81 in air and water PA expenditures. Finally, it introduces estimates of business PAC costs, which are designed to facilitate analysis that is more comprehensive than could be undertaken previously.

NOTE.—Estimates of business PAC costs, presented in this article for the first time, are a result of research by Frederick J. Dreiling on the GNP-account treatment of PAC.

1. PAC expenditures are for the reduction of pollutant emissions and the collection and disposal of solid wastes by means acceptable to Federal, State, and local authorities. PAC expenditures consist of those for pollution abatement, which reduce pollutant emissions directly, plus expenditures for regulation and monitoring and for research and development, which lead indirectly to the reduction of emissions. Expenditures for other aspects of environmental control, such as expenditures for natural resource conservation or protection of endangered species, are excluded. Pollutants are defined as substances and other emissions (e.g., noise) that degrade the quality of air or water shared by all.

Estimates for recent years

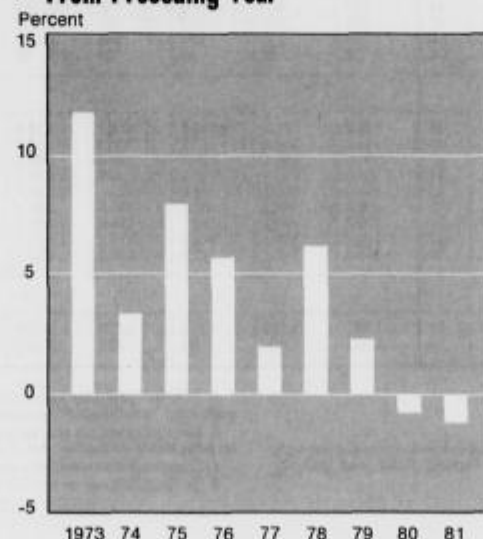
PAC expenditures are classified in table 1 by type (e.g., water PAC), function (e.g., research and development), sector (e.g., business), and accounting category (e.g., on capital account). Table 2 shows additional detail for business and government expenditures for air and water pollution abatement (most of PAC). Table 3 shows expenditures for aspects of solid waste management, including, but not limited to, collection and disposal. Table 4 shows price changes for total PAC expenditures and selected components.

Real PAC spending in 1981.—In absolute terms, the 1981 decrease in total PAC spending was \$0.3 billion (in 1972 dollars) and was due to a large decrease in water PAC. Water

PAC spending decreased \$1.4 billion, or 12½ percent. Air PAC spending increased \$0.9 billion, or 7½ percent; solid waste disposal spending increased \$0.2 billion, or 4 percent; and "other and unallocated" spending increased slightly.

The largest absolute changes in air and water PAC spending were for PA capital (see accompanying tabulation). For water, each major category of capital spending again decreased. Public sewer systems construction spending (government enterprise fixed capital) decreased \$1.0 billion, or 23 percent, the third consecutive decrease. Plant and equipment spending by business decreased \$0.3 billion, or 16½ percent, the fifth decrease. Spending for septic systems and connectors to public sewers (residential systems) decreased \$0.1 billion, the third decrease.

CHART 4
Real PAC Expenditures: Percent Change From Preceding Year



U.S. Department of Commerce, Bureau of Economic Analysis

[Change in 1981, billions of 1972 dollars]

Total expenditures for PAC.....	- .3
Water PA	- 1.4
Capital	- 1.4
Public sewer systems	- 1.0
Plant and equipment	- .3
Residential systems	- .1
Current account1
Air PA9
Capital8
Motor vehicle emission abatement	1.1
Plant and equipment	- .3
Current account1
Solid waste disposal1
Capital	0
Current account1
Other	0

The large decrease in spending for construction of public sewer systems was due to decreases in related Federal grants-in-aid and in State and local funding for sewer systems. The decrease in Federal grants-in-aid for sewer systems was the first signifi-

cant one since 1978 and was part of a slowdown in these grants since 1977 (table 5). (See the accompanying box for a background discussion of these grants.) The decrease in State and local funding in 1981, the largest since these decreases began in 1979, was due to record high interest rates on municipal bonds, taxpayer's increased sensitivity to growth in gov-

ernment, and reduced housing construction requiring connection to sewer systems. The decrease in recent years in construction of public sewer systems is part of a general trend for State and local total construction.

For air, spending for motor vehicle emission abatement devices (consumer and business spending) increased \$1.1 billion, or 31 percent, after in-

creasing each year since 1972. A decrease in plant and equipment spending of \$0.3 billion, or 11½ percent, was a partial offset.

Motor vehicle emission abatement spending increased, despite a decrease in unit sales of cars, due to the addition of expensive computer-like electronic equipment to regulate engine operation and emissions. This equip-

Table 1.—Expenditures for Pollution Abatement and Control in Current

	Line	1972	1973	1974	1975	1976	1977	1978 ^a					
		Total	Total	Total	Total	Total	Total	Total	Air	Water	Solid waste	Other and unallocated ^b	
Millions of													
Pollution abatement and control													
Pollution abatement ^c	1	18,434	21,358	23,251	25,983	24,851	27,362	42,416	17,364	19,978	5,398	-234	
Personal consumption	2	17,246	20,587	22,373	24,137	24,571	26,862	40,882	16,117	18,253	5,518	-1,866	
Durable goods	3	1,830	2,045	2,337	2,437	2,431	2,431	4,782	1,782	1,782	1,782		
Nondurable goods and services	4	476	670	690	1,361	1,321	1,321	2,436	1,321	1,321	1,321		
Business	5	10,400	13,097	15,127	18,184	20,885	20,781	25,632	11,475	11,915	4,479	-1,075	
On capital account	6	5,399	6,758	7,454	8,383	9,459	10,181	10,822	5,317	4,984	582		
On current account	7	5,001	6,339	7,673	9,801	10,426	12,600	14,810	6,158	6,931	8,897	-1,075	
Private	8	4,828	6,169	7,503	9,633	10,258	12,439	14,650	6,000	6,800	8,897		
Government enterprises	9	1,171	1,170	1,170	1,170	1,222	1,222	8,061	72	2,978	(*)	(*)	
Costs recovered	10	-428	-470	-483	-589	-587	-936	-1,075				-1,075	
Government	11	4,749	5,975	6,484	7,770	8,848	8,848	10,388	288	8,038	2,038	30	
Federal	12	139	203	284	432	472	490	472	38	316	47	39	
State and local	13	1,311	1,433	1,591	1,738	1,884	1,884	2,213	(*)	218	1,991	1	
Government enterprise fixed capital	14	3,289	2,738	4,002	6,387	4,042	6,128	7,597	183	7,504			
Regulation and monitoring	15	867	490	645	653	725	843	943	276	406	55	218	
Federal	16	280	278	345	381	402	429	587	58	185	39	201	
State and local	17	167	212	246	272	323	414	443	163	219	22	12	
Research and development	18	823	905	938	1,108	1,279	1,478	1,633	381	219	35	449	
Private	19	519	669	698	868	704	849	995	777	59	15	59	
Federal	20	205	225	343	448	528	578	592	146	104	16	328	
State and local	21	89	65	39	47	45	51	57	5	17	4	39	
Millions of constant													
Pollution abatement and control													
Pollution abatement ^c	22	18,434	20,603	21,307	23,083	24,320	24,800	26,358	19,185	11,954	4,342	-150	
Personal consumption	23	17,246	19,296	19,961	21,644	22,886	23,280	24,886	18,423	11,654	4,284	-574	
Durable goods	24	1,830	1,965	2,116	2,259	2,267	2,267	2,267	4,265	4,265	4,265		
Nondurable goods and services	25	476	670	691	1,361	1,361	1,361	1,361	1,361	1,361	1,361		
Business	26	10,400	12,938	12,972	15,467	17,788	14,215	15,011	6,284	8,425	2,855	-389	
On capital account	27	5,399	6,406	6,298	8,063	8,762	8,762	8,762	3,364	3,364	3,364		
On current account	28	5,001	6,532	6,674	7,404	9,026	5,453	6,249	2,920	5,061	2,491	-588	
Private	29	4,828	6,033	6,253	7,326	8,026	7,326	7,326	2,920	5,061	2,491		
Government enterprises	30	1,171	1,263	1,294	1,330	1,444	1,444	1,444	1,444	1,444	1,444		
Costs recovered	31	-428	-470	-483	-589	-587	-936	-936				-687	
Government	32	4,749	5,975	6,484	7,770	8,848	8,848	10,388	163	8,998	1,445	12	
Federal	33	139	199	246	381	402	402	402	48	185	40	11	
State and local	34	1,311	1,433	1,591	1,738	1,884	1,884	2,213	(*)	1,02	1,415	1	
Government enterprise fixed capital	35	3,289	2,738	3,913	6,387	4,042	6,128	7,597	116	4,793			
Regulation and monitoring	36	867	458	616	617	698	871	929	179	268	36	143	
Federal	37	280	259	308	365	365	365	365	62	135	19	184	
State and local	38	167	197	212	213	334	374	380	116	189	17	5	
Research and development	39	823	949	948	1,108	1,279	1,478	1,633	374	187	22	282	
Private	40	519	655	612	801	891	891	904	478	61	10	57	
Federal	41	205	225	324	448	528	578	592	82	55	10	205	
State and local	42	89	61	34	38	36	37	38	5	11	5	10	
Selected implicit													
Pollution abatement and control													
Pollution abatement ^c	45	109.9	106.4	123.3	134.4	142.4	152.1	164.9	179.3	166.3	182.2	171.7	
Personal consumption	46	100.0	106.3	126.0	135.9	139.8	145.4	155.3	185.3				
Business	47	100.0	106.2	125.5	135.9	147.6	159.0	171.2	175.5	172.7	162.4	188.2	
On capital account	48	100.0	106.1	119.9	132.5	149.0	147.4	161.0	167.1	164.6	168.2		
On current account	49	100.0	107.4	117.1	145.5	164.6	167.6	179.4	180.1	161.8	150.5	188.2	
Government	50	100.0	107.4	117.1	132.5	149.0	147.4	161.0	167.1	164.6	168.2		
Regulation and monitoring	51	100.0	107.4	117.1	132.5	149.0	147.4	161.0	167.1	164.6	168.2		
Research and development	52	100.0	106.4	117.6	132.5	149.0	147.4	161.0	167.1	164.6	168.2		
Addendum: Business capital consumption													
Valued at replacement cost in current dollars	54	1,881	2,195	2,939	3,978	4,322	5,061	5,911					
Valued at replacement cost in constant 1972 dollars	55	1,881	2,094	2,891	2,719	3,866	3,413	3,721					

* Revised.

* Preliminary.

* Less than \$500,000.

1. Includes expenditures for air and water pollution abatement and control. Includes expenditures for solid waste collection and disposal by means acceptable to Federal, State, and local authorities. Excludes agricultural production except feedlot operations.

2. "Other" includes expenditures for abatement and control of noise, radiation, and pesticide pollution; "unallocated" includes business expenditures not assigned to media.

3. Expenditures are attributed to the sector that performs the air or water pollution abatement or solid waste collection and disposal.

4. Current-dollar estimates divided by constant-dollar estimates.

5. To facilitate conversion of expenditures to a cost basis.

ment, the largest added expense per car due to PA since 1968, was designed to help meet tightened emission abatement requirements for 1981 model year passenger cars.

The 1981 decrease in air and water PA plant and equipment spending occurred despite upcoming deadlines for improved PA (1982 for air and 1983-84 for water). Deadlines in the 1980's

may be having less effect on the pattern of changes in spending than did similar deadlines in 1970's, when laws setting deadlines were relatively new and postponement of deadlines not yet a regular occurrence.

Within the solid waste category, capital spending remained at the 1980 level. Current-account spending, which has increased each year since

1973, increased \$0.1 billion, or 3% percent.

Prices in 1981.—Price increases slowed in 1981, the first time since 1976, according to the fixed-weighted and chain price indexes for PAC goods and services (table 4). Both indexes increased 9% percent in 1981,

(Text continued on p. 20)

and Constant Dollars and Selected Implicit Price Deflators *

1978*					1980*					1981*					Line
Total	Air	Water	Solid waste	Other and unallocated *	Total	Air	Water	Solid waste	Other and unallocated *	Total	Air	Water	Solid waste	Other and unallocated *	
current dollars															
49,944	21,331	21,789	7,654	-890	58,961	28,908	22,424	8,783	-752	68,225	28,494	21,724	9,971	-883	1
47,982	19,704	21,156	7,058	-1,304	58,086	24,555	21,578	8,608	-1,531	67,154	26,142	20,972	9,668	-1,622	2
6,946	6,946				7,392	7,392				9,011	9,011				3
2,913	2,913				8,715	8,715				6,196	6,196				4
2,734	2,734				8,378	8,378				8,813	8,813				5
89,066	18,631	12,446	5,269	-1,369	44,824	18,094	13,186	5,038	-1,809	27,532	18,660	13,844	6,545	-1,767	6
12,969	6,317	5,265	124		13,099	7,198	5,065	885		18,509	7,332	4,787	918		7
17,767	7,873	7,178	4,056	-1,309	31,225	9,432	8,097	6,245	-1,869	24,923	10,739	9,187	5,985	-1,767	8
18,936	7,281	8,783	4,065		13,747	9,344	4,159	5,245		31,145	10,982	4,923	5,985		9
8,823	156	8,416	(*)		4,087	145	4,329	(*)		4,635	156	4,509	(*)		10
-1,360				-1,360	-1,810				-1,810	-1,789				-1,789	11
11,390	898	8,481	2,245	65	11,587	473	8,511	2,355	73	10,511	500	7,129	2,824	169	12
548	108	847	48	68	485	96	375	65	70	533	94	594	98	129	13
2,451	(*)	257	2,198		2,772	(*)		2,478		8,065	(*)	279	2,789		14
8,361	265	8,076			8,821	318	7,948			7,012	496	6,696			15
1,867	300	425	85	267	1,586	323	825	129	912	1,395	594	513	246	311	16
699	140	353	37	236	768	123	828	64	280	848	195	283	163	286	17
474	290	198	49	82	602	207	199	63	34	550	226	226	88	25	18
1,776	1,057	248	48	487	1,762	1,052	338	49	468	1,774	1,018	229	62	454	19
1,143	815	111	15	162	1,107	887	106	18	88	1,182	858	188	14	97	20
554	195	118	34	577	691	180	95	32	536	644	185	121	44	344	21
59	8	19	4	38	64	5	28	3	32	29	(*)	11	4	28	22
(1972) dollars															
21,936	16,749	11,522	4,540	-164	26,739	11,256	11,429	4,649	-199	25,497	12,125	9,699	4,928	-208	23
25,235	9,976	11,422	4,452	-623	28,918	10,504	10,808	4,541	-598	24,781	11,492	9,253	4,678	-815	24
3,100	3,100				3,344	3,344				4,094	4,094				25
1,943	1,943				2,236	2,236				3,025	3,025				26
1,158	1,158				1,949	1,949				1,089	1,089				27
15,651	6,623	6,497	3,194	-668	15,582	6,988	6,129	8,193	-678	15,498	7,083	5,789	8,890	-681	28
6,992	3,796	2,902	386		6,816	8,848	2,671	397		6,510	8,345	2,168	886		29
8,658	2,978	2,866	2,738	-653	8,787	3,056	3,698	2,883	-678	8,970	8,131	5,529	2,944	-691	30
7,531	2,946	1,848	2,738		7,614	3,045	1,766	2,883		7,786	8,098	1,786	2,884		31
1,780	23	1,748	(*)	(*)	1,881	39	1,791	(*)	(*)	1,875	39	1,835	(*)	(*)	32
-663				-663	-875				-875	-891				-691	33
6,485	132	4,925	1,338	90	6,092	238	4,480	1,844	40	5,147	226	3,467	1,379	75	34
897	46	194	28	27	862	43	143	39	38	856	41	118	84	64	35
1,428	(*)	115	1,318	8	1,434	(*)	116	1,314	4	1,470	(*)	114	1,344	12	36
4,761	144	4,617			4,497	135	4,222			3,422	135	3,287			37
658	181	251	52	160	728	180	285	72	181	731	166	297	127	169	38
872	63	145	22	141	683	71	136	38	162	459	69	150	84	156	39
281	118	115	23	19	269	109	107	34	19	272	109	107	44	13	40
1,046	593	149	26	278	984	872	126	27	258	955	555	126	33	240	41
604	628	83	8	58	681	495	61	6	56	604	494	69	8	62	42
849	66	73	16	196	827	72	53	19	195	851	71	63	23	180	43
48	6	12	2	24	26	3	18	2	16	35	(*)	5	2	7	44
price deflators *															
185.8	196.7	184.2	168.8	189.8	209.7	227.5	203.3	189.5	213.1	208.1	243.3	208.1	206.1	204.6	45
186.5	197.5	185.9	168.8	207.2	211.5	209.9	204.3	189.4	204.9	201.2	248.9	201.2	204.7	203.7	46
192.1	192.1				212.1	212.1				200.1	200.1				47
192.1	204.9				200.5	200.5				202.4	200.0				48
176.0	178.4	181.6	163.8	208.2	182.3	187.1	197.0	180.5	207.3	207.5	200.0	207.1	207.4	208.7	49
206.1	207.5	209.5	165.3		202.1	207.2	207.5	187.1	207.3	207.9	204.4	202.4	201.0	208.7	50
175.0	191.4	176.2	167.9	185.3	190.2	197.0	190.0	187.9	194.5	206.2	221.8	206.2	204.2	208.5	51
168.8	185.8	182.0	164.4	180.3	178.0	182.9	177.5	178.8	173.5	191.2	199.3	192.8	188.3	184.1	52
169.7	173.3	181.0	166.6	184.1	179.1	206.3	179.6	179.6	180.1	185.7	183.6	187.2	189.7	189.2	53
allowance (millions of dollars) *															
7,860					8,314					9,849					54
4,070					4,401					4,713					55

Table 2.—Business and Government Expenditures for Air and Water Pollution Abatement in Current and Constant Dollars and Selected Implicit Price Deflators

	1972	1973	1974	1975	1976	1977	1978 *		1979 *			1980 *			1981 *			
	Total	Total	Total	Total	Total	Total	Total	Air	Water	Total	Air	Water	Total	Air	Water	Total	Air	Water
Millions of current dollars																		
Business (line 9) *	9,113	11,149	13,193	15,751	17,993	19,792	22,287	11,972	11,215	12,150	12,431	12,448	29,253	16,689	12,163	32,474	18,439	13,844
On capital account (line 7)	5,029	5,422	7,015	8,416	9,004	9,551	10,991	5,317	4,984	11,526	5,317	5,268	12,264	7,135	5,066	12,599	7,532	4,797
Motor vehicle emission abatement	225	339	444	770	993	1,156	1,497	1,407	1,407	1,519	1,519	1,519	2,127	1,127	1,127	2,522	2,522	2,522
Plant and equipment expenditures *	3,501	4,512	5,297	6,575	7,782	8,690	10,167	5,919	5,196	11,506	5,919	5,919	13,506	8,444	6,072	15,211	10,552	4,639
Residential systems *	1,560	1,469	1,566	1,663	1,750	1,876	1,978	1,978	1,978	2,007	2,007	2,007	2,007	2,007	2,007	2,007	2,007	2,007
Agricultural business *	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
On current account (line 8)	4,084	5,727	6,178	7,335	8,989	10,241	11,296	6,655	6,231	14,551	7,114	7,180	17,089	9,554	7,097	19,775	10,786	9,157
Private (line 9)	2,971	3,884	4,545	5,440	6,459	7,409	8,536	4,993	4,565	11,008	7,287	7,368	13,506	8,444	6,159	15,211	10,552	4,639
Motor vehicle emission abatement	435	619	1,090	1,294	1,492	1,659	1,912	1,912	1,912	2,048	2,048	2,048	2,048	2,048	2,048	2,048	2,048	2,048
Manufacturing establishments	1,368	1,509	1,598	2,221	2,754	3,312	3,747	2,088	1,710	4,316	2,587	1,977	4,593	2,709	2,184	5,495	3,045	2,448
Privately owned electric utility establishments	311	396	647	698	719	871	1,844	944	100	1,498	1,882	114	1,510	1,780	139	1,905	1,839	147
Other nonmanufacturing establishments	567	595	681	975	1,324	1,475	1,314	790	1,124	2,295	906	1,890	2,580	1,451	1,475	2,529	1,176	1,850
Residential systems *	195	211	229	247	268	292	315	315	315	315	315	315	315	315	315	315	315	315
Agricultural business *	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Government enterprise (line 10)	1,151	1,842	1,634	1,895	2,220	2,505	3,061	72	72	2,978	5,521	106	8,415	4,037	148	8,909	4,864	158
Publicly owned electric utilities	26	33	62	66	66	66	88	73	10	118	106	12	161	148	12	171	158	15
Public sewer systems *	1,125	1,809	1,571	1,829	2,154	2,439	2,987	2,987	2,987	3,432	3,432	3,432	3,432	3,432	3,432	4,492	4,492	4,492
Other	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Government (line 12)	3,892	4,099	5,699	5,966	6,468	6,794	8,299	283	8,888	8,999	364	8,691	8,999	473	8,611	7,628	500	7,126
Federal (line 13)	181	181	252	358	369	395	404	96	316	459	108	347	368	95	375	339	94	244
Federal excl. highway erosion abatement	126	178	248	359	367	379	400	90	310	442	106	339	362	85	367	330	94	236
Highway erosion abatement	5	3	4	6	6	6	7	7	7	7	7	7	7	7	7	7	7	7
State and local (line 14)	171	171	189	211	265	199	218	(*)	218	257	(*)	257	258	(*)	258	278	(*)	278
State and local excl. highway erosion abatement	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Highway erosion abatement	171	171	189	211	265	199	218	(*)	218	257	(*)	257	258	(*)	258	278	(*)	278
Government enterprise fixed capital (line 15)	3,299	3,739	4,596	5,387	5,941	6,123	7,899	199	7,604	8,841	265	8,976	8,921	378	7,948	7,012	406	5,606
Publicly owned electric utilities	91	136	177	164	228	269	329	193	186	387	265	102	468	378	91	474	406	88
Public sewer systems *	3,208	3,603	4,419	5,223	5,713	5,854	7,570	7,408	7,408	7,975	7,975	7,975	7,975	7,975	7,975	7,975	7,975	7,975
Millions of constant (1972) dollars																		
Business (line 23) *	9,113	10,489	12,948	14,133	14,734	15,149	15,699	6,294	4,456	13,180	4,688	4,497	13,981	6,933	4,139	13,871	7,833	4,759
On capital account (line 21)	5,029	6,105	6,947	8,354	8,439	8,419	6,412	3,294	3,028	9,846	3,705	2,962	6,419	3,645	2,571	6,114	3,948	2,168
Motor vehicle emission abatement	225	289	419	579	787	990	1,008	1,008	1,008	1,205	1,205	1,205	1,205	1,205	1,205	1,205	1,205	1,205
Plant and equipment expenditures *	3,501	4,270	4,841	4,911	4,775	4,897	4,844	2,376	1,828	4,805	2,494	1,809	4,552	2,541	1,711	4,578	2,283	1,425
Residential systems *	1,560	1,294	1,086	886	886	1,089	1,097	1,097	1,097	1,097	1,097	1,097	1,097	1,097	1,097	1,097	1,097	1,097
Agricultural business *	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
On current account (line 22)	4,084	4,370	4,920	4,779	5,301	5,730	6,287	2,999	3,428	3,345	3,973	3,536	6,442	3,388	3,068	6,197	3,137	3,429
Private (line 23)	2,971	3,114	3,225	3,449	3,857	4,198	4,548	2,739	1,761	4,794	3,945	1,948	4,813	3,945	1,766	4,893	3,098	1,795
Motor vehicle emission abatement	435	685	780	886	986	973	1,068	1,068	1,068	1,118	1,118	1,118	1,118	1,118	1,118	1,118	1,118	1,118
Manufacturing establishments	1,368	1,490	1,585	1,427	1,843	1,795	1,971	998	892	1,958	1,038	908	1,588	1,005	894	1,892	1,001	891
Privately owned electric utility establishments	311	397	614	624	684	878	417	367	58	470	419	52	825	474	51	500	450	59
Other nonmanufacturing establishments	567	611	582	625	729	734	941	578	595	1,028	895	827	984	389	695	922	389	695
Residential systems *	195	200	206	206	213	216	224	224	224	224	224	224	224	224	224	224	224	224
Agricultural business *	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Government enterprise (line 24)	1,151	1,258	1,295	1,390	1,444	1,513	1,704	25	1,676	1,730	32	1,748	1,691	33	1,791	1,875	35	1,836
Publicly owned electric utilities	26	28	30	25	31	39	34	28	3	3	3	6	45	39	5	44	39	6
Public sewer systems *	1,125	1,230	1,265	1,365	1,413	1,474	1,671	1,671	1,671	1,742	1,742	1,742	1,742	1,742	1,742	1,742	1,742	1,742
Other	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Government (line 26)	3,892	3,995	4,269	4,745	4,934	4,907	5,293	193	5,099	5,118	192	4,925	4,797	228	4,490	3,892	193	4,467
Federal (line 27)	181	189	269	375	367	352	348	48	199	242	48	194	186	43	142	157	41	116
Federal excl. highway erosion abatement	126	182	269	372	365	345	343	48	196	238	48	194	182	43	139	154	41	115
Highway erosion abatement	5	4	3	4	4	4	3	3	3	3	3	3	3	3	3	3	3	3
State and local (line 28)	171	165	197	148	148	117	109	(*)	192	115	(*)	115	116	(*)	116	114	(*)	114
State and local excl. highway erosion abatement	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)	(*)
Highway erosion abatement	171	165	197	148	148	117	109	(*)	192	115	(*)	115	116	(*)	116	114	(*)	114
Government enterprise fixed capital (line 29)	3,299	3,432	3,919	4,222	4,534	4,598	4,918	115	4,799	4,761	144	4,617	4,407	185	4,222	3,402	185	4,287
Publicly owned electric utilities	91	129	141	116	152	171	199	115	82	200	144	68	280	185	46	218	185	51
Public sewer systems *	3,208	3,303	3,778	4,096	4,382	4,427	4,717	4,717	4,717	4,661	4,661	4,661	4,176	4,176	4,176	4,176	4,176	4,176
Selected implicit price deflators *																		
Plant and equipment expenditures (see above, business capital account)	100.0	105.5	122.0	135.0	142.0	151.8	168.0	164.5	161.1	173.0	180.2	177.2	195.5	199.5	191.8	217.7	228.5	213.4
Manufacturing, privately owned electric utilities, and other nonmanufacturing establishments (see above, business current account)	100.0	109.1	145.2	163.9	178.5	191.2	206.4	218.8	193.4	233.6	252.8	211.6	274.7	295.7	247.9	304.4	323.4	374.6
Public sewer systems (see above, business current account)	100.0	104.0	124.3	141.2	152.4	164.2	171.5	177.8	156.3	195.8	219.3	195.8	219.3	219.3	219.3	219.3	219.3	219.3
Public sewer systems (see above, government, fixed capital)	100.0	101.4	117.2	124.2	132.8	142.2	155.2	156.2	156.2	174.9	174.9	174.9	198.8	198.8	198.8	204.0	204.0	204.0

* Revised.

* Preliminary.

* Less than \$500,000.

1. Consists of air and water pollution abatement expenditures only.

2. Line numbers correspond to those in table 1.

3. Consists of manufacturing, private and cooperatively owned electric utilities, and other non-manufacturing companies.

4. Consists of private septic systems and sewer connections linking household plumbing to street sewers.

5. Feeder lines only, see footnote 1 on table 1.

6. Public sewer systems consist of treatment plants, collection sewers, interceptor sewers, pumping stations, and dry waste disposal plants.

7. Current-dollar estimates divided by constant-dollar estimates.

The Federal Grants Program for Publicly Owned Wastewater Treatment Works

The description that follows of the Federal program of grants-in-aid for the construction of publicly owned treatment works is to provide background information about a major part of total PAC spending: construction of public sewer systems. These systems accounted for 16½ percent of real PAC spending during 1972-81, and decreases in their construction were major factors in the decreases in total PAC spending in 1980 and 1981.

The Federal Water Pollution Control Act Amendments of 1972 established the existing grants program. Among the provisions, two are of special note: (1) For approved wastewater treatment works projects, the Federal share of the covered construction costs (State and local governments pay all costs not covered, e.g., for sewage collection systems of less than the trunk-line level) was 75 percent and the State and local share, 25 percent; (2) municipalities were required to meet secondary treatment requirements by July 1977. Approval of a project was contingent mainly on conformance of technology to that for medium-to-large scale collection and central processing of wastes, but rationing of available funds was also involved. Secondary treatment of wastewater was generally considered to be biological treatment (e.g., using bacterial action) in contrast to primary treatment, a lower level of treatment that is largely mechanical (e.g., using screening devices). Secondary treatment requirements were set at a stringent level and were described both in terms of percent removal of wastes and quality of effluent. When designing the program, Congress expected that the Federal share of construction costs would remain high until the backlog of needs for construction was eliminated and that substantial progress toward eliminating the backlog could be made in 5 years.

The wastewater treatment works grants program was beset during 1972-81 by difficulties stemming from its design and by external difficulties. These sources of difficulties combined after 1977 to bring an end to steady increases in real grants; grants decreased each year thereafter, except in 1979. Decreases were significant in 1978 and 1981. The difficulties stemming from the program's design gradually became apparent: (1) The preferred—i.e., grant-eligible—pollution abatement technology was high cost relative to alternatives, and operation costs, borne by municipalities alone, were large; (2) secondary treatment requirements were set at a level difficult to attain even with the preferred technology; and (3) although the preferred technology was affordable only in densely populated areas, the treatment requirements were uniform for all areas. The external difficulties were inflation and, later, high interest rates. Inflation accelerated after 1972, escalating construction costs and depleting Federal as well as State and local funds. As a result of difficulties (1) and (2) in combination with inflation, only one-half of major municipal systems met secondary treatment requirements by 1977. As a result of difficulty (3), most other treatment systems did not meet the requirements. The taxpayer resistance to growth in State and local government programs that became increasingly apparent around 1978 augmented concern over the extent to which construction and operation of high-cost treatment

systems should continue to be encouraged. Inflation contributed to taxpayer resistance, on the one hand, by raising tax bases and taxes and, on the other, by requiring enlarged bond issues to cover the escalating construction costs. High interest rates made it difficult for State and local governments to finance their costs, which accounted for an average of 56 percent of total sewer systems construction costs in 1978 and 89 percent in 1981. Despite these difficulties, 75 percent of public sewer systems met secondary treatment requirements by 1980.

These difficulties led, in time, to changes in program legislation. Amendments in 1977 mandated investigation of alternatives to the preferred technology. The emphasis was to be on medium-to-large scale collection technology and central processing of wastes rather than septic systems or networks thereof, notwithstanding their advantages. The Federal share of construction costs for alternatives that were innovative was increased as an incentive for their exploration. Amendments in 1977 also extended the deadline for meeting secondary treatment requirements to 1988 and allowed, under specified conditions, increased discharge of wastes into the ocean. The latter change increased the options of municipalities without liberalizing secondary treatment requirements. Amendments in 1981 extended the deadline for meeting secondary treatment requirements to 1988 and liberalized requirements for some locations, allowing oxidation ponds, lagoons, and trickling filters to be used if their use would not adversely affect water quality. These amendments also decreased the Federal share of construction costs to 55 percent beginning in fiscal year 1985. The decrease was meant to cause some shift away from the technology preferred until 1985 and indicated that, although this technology was not being put in place at the rate or to the extent originally envisioned by Congress, it was being put in place where most needed. The decrease was viewed as allowing markets to have an increased influence on technology selection and as reducing Federal involvement in State and local government decisionmaking. The long-term effect of these program changes will probably be annual decreases in grants; a decrease in grant is indicated by available data for 1982. A surge in the mid-1980's is possible if State and local governments rush to take advantage of the remaining years of higher Federal funding.

Although the substantial increases in grants during 1972-77 were the primary stimulus to the increases in spending for construction of public sewer systems, after 1977 factors other than changes in grants—external factors impacting directly on State and local governments—began strongly to influence sewer systems construction. Unless their depressing effect on sewer systems construction is reversed (e.g., by lower interest rates, a strong recovery in housing construction requiring connection to sewer systems, or a resurgence of concern about the impact of residential growth on water quality), these external factors, in combination with the expected decreases in grants, will lead to further decreases in sewer systems construction.

compared with a 13½-percent increase in 1980. Energy prices accounted for much of the deceleration. A fixed-weighted index of energy-purchase components (about 10 percent of total PAC) decelerated from an increase of 28 percent in 1980 to 11 percent in 1981. A PAC fixed-weighted index that excludes these components decelerated much less—from a 10-percent increase in 1980 to a 9½-percent increase in 1981.

The increase in the implicit price deflator slowed to 9 percent from 13 percent in 1980. The implicit price deflator measures the average price of PAC purchases in each year; changes in the deflator reflect changes in prices and shifts in the composition of PAC purchases from year to year. The chain and fixed-weighted price indexes, because the composition of PAC purchases in them is held constant, measure only changes in prices. (The chain index is based on the composition of purchases in each preceding year and the fixed-weighted price index is based on the composition of purchases in a base year, 1972.)

Real PAC spending in 1982.—A continued decrease in spending in 1982, larger in absolute terms than in 1981, is indicated by the limited information available as of early 1983. Public sewer systems construction spending decreased, as indicated by data for the first three quarters. Business PA plant and equipment spending decreased, assuming business spending plans reported in a BEA survey in

Table 3.—Constant-Dollar Spending by Business and Government for Solid Waste Collection and Disposal and Related Series

Line	1972	1973	1974	1975	1976	1977	1978 *	1979 *	1980 *	1981 *
Millions of constant (1972) dollars										
Solid waste collection and disposal by means acceptable to Federal, State, and local authorities.....	1	3,416	3,629	3,554	3,576	3,816	3,382	4,253	4,434	4,519
Solid waste management.....	2	4,680	4,627	4,554	4,597	5,206	6,413	6,769	6,990	6,104
Pollution abatement.....	3	387	354	1,182	1,259	1,486	1,619	1,697	2,171	2,554
Other.....	4	3,792	3,695	3,638	3,637	3,789	3,786	3,373	3,743	3,737
Percent change from preceding year										
Solid waste collection and disposal by means acceptable to Federal, State, and local authorities.....	5		4	3.6	6	6.7	4.4	6.8	4.2	1.8
Solid waste management.....	6		1	3.6	9	6.8	4.0	6.6	3.6	2.9
Pollution abatement.....	7		12.1	18.9	8.4	14.1	12.6	17.3	14.6	8.4
Other.....	8		-2.8	0	-1.5	3.6	7	2.8	-1.6	-0.6

* Revised.

* Preliminary.

1. Consists of spending for the avoidance of the slowing of production or consumption activity due to the accumulation of solid waste and for other purposes except pollution abatement.

late 1981 were realized.² Motor vehicle emission abatement devices spending decreased, as indicated by only minor additions of devices for model year 1982 and decreased unit sales of vehicles. The sum of these decreases is large. Information for all other categories is sketchy, but there is no indication of a substantial increase.

Revisions in real spending, 1978-80.—The last 3 years of the PAC spending series have been revised. Revisions were upward each year: \$0.2 billion in 1978, \$0.5 billion in 1979, and \$0.3 billion in 1980. The two

major components revised were motor vehicle emission abatement devices spending and nonmanufacturing (excluding electric utilities) air and water PA current-account spending. The incorporation of new data on imported light-duty trucks and the reclassification by the Environmental Protection Agency of trucks into light- and heavy-duty weight classes led to upward revisions of abatement device spending (i.e., "personal consumption, durables" plus "business capital, motor vehicle emission abatement" spending) from \$0.1 to \$0.3 billion in each of the 3 years. The incorporation of information for an additional year led to a higher ratio of nonmanufacturing to manufacturing net capital stocks of PA plant and

2. For details, see Gary L. Rutledge and Betsy D. O'Connor, "Plant and Equipment Expenditures by Business for Pollution Abatement, 1981 and Planned 1982," Survey 62 (June 1982): 17-21 and 72.

Table 4.—Federal Grants-in-Aid to State and Local Governments for

Line	1972	1973	1974	1975	1976	1977	1978 *				
	Total	Total	Total	Total	Total	Total	Total	Air	Water	Solid waste	Other and unallocated
Millions of											
Pollution abatement and control.....	1	923	1,067	2,242	2,978	3,396	4,061	4,160	71	4,012	35
Pollution abatement.....	2	788	916	2,113	2,721	3,189	3,879	(*)	2,871	7	1
Regulation and monitoring.....	3	66	75	91	102	151	214	68	124	15	12
Research and development.....	4	69	76	38	55	56	67	8	17	4	29
Millions of constant											
Pollution abatement and control.....	5	923	983	1,966	2,964	3,546	2,647	2,644	45	2,558	18
Pollution abatement.....	6	788	851	1,784	2,180	2,661	2,679	2,471	(*)	2,466	1
Regulation and monitoring.....	7	66	71	78	79	110	132	136	40	78	8
Research and development.....	8	69	61	34	35	65	97	38	5	11	19

* Revised.

* Preliminary.

* Less than \$500,000.

1. Constant-dollar estimates are derived using measures of price change of goods and services purchased by State and local governments for pollution abatement and control.

Table 4.—Percent Change From Preceding Year in Pollution Abatement and Control Expenditures (Total and Selected Components) in Current and Constant Dollars, Implicit Price Deflators, and Price Indexes

	1972-80 percentage annual rate ¹	1973	1974	1975	1976	1977	1978*	1979*	1980*	1981*
Pollution abatement and control—total:										
Current dollars	14.9	19.0	19.8	17.8	12.2	9.6	14.4	14.9	12.3	7.6
1972 dollars	4.7	11.8	8.4	8.0	5.7	2.9	6.2	2.3	-3.8	-1.2
Implicit price deflator	9.6	6.4	15.9	8.8	6.1	7.4	7.7	12.4	19.2	8.9
Chain price index	10.8	6.5	15.9	9.8	6.2	7.3	7.7	12.4	18.5	9.4
Fixed-weighted price index	9.9	6.5	15.9	9.8	6.2	7.4	7.9	12.4	18.4	9.6
Pollution abatement and control—air:										
Current dollars	18.7	28.4	25.5	22.9	10.3	10.0	11.2	21.4	21.8	15.2
1972 dollars	7.1	20.3	8.8	12.7	4.7	2.7	8.9	5.5	4.7	7.7
Implicit price deflator	10.8	6.2	21.8	8.1	4.4	7.1	7.0	16.0	16.2	8.9
Chain price index	11.7	6.5	21.7	10.8	6.7	7.3	7.1	15.6	17.5	9.4
Fixed-weighted price index	11.7	6.5	22.5	10.9	6.7	7.7	7.0	15.8	18.1	10.1
Business capital—air:										
Current dollars	14.9	37.9	16.7	35.7	-3	3.8	7.3	18.8	13.9	9.6
1972 dollars	6.2	32.0	1.8	18.6	-4.7	-2.0	8	9.5	3.9	2.8
Implicit price deflator	8.1	4.5	15.2	10.6	4.7	5.9	6.4	8.6	8.7	6.8
Chain price index	8.8	4.6	15.7	11.7	5.9	6.5	7.0	9.1	10.8	8.2
Fixed-weighted price index	8.8	4.6	16.9	11.9	5.2	6.7	6.9	9.4	10.6	10.8
Business current account, private—air:										
Current dollars	23.1	18.2	49.8	20.0	17.6	17.1	15.8	27.9	28.6	13.3
1972 dollars	9.8	7.3	6.4	9.1	11.8	6.7	7.6	5.5	8.4	1.7
Implicit price deflator	16.8	10.1	38.1	10.0	5.2	9.8	7.4	21.2	24.4	11.8
Chain price index	16.2	10.2	37.2	10.4	5.6	9.4	7.5	20.7	28.6	11.3
Fixed-weighted price index	14.7	10.2	37.2	10.5	5.6	9.9	8.8	18.4	21.2	11.8
Pollution abatement and control—water:										
Current dollars	12.6	15.8	15.3	16.5	14.4	8.5	18.0	9.7	2.9	-3.1
1972 dollars	2.9	8.4	2.1	6.5	6.6	4	8.4	-1.9	-6.8	-12.6
Implicit price deflator	9.2	6.7	12.8	8.4	7.2	8.1	9.0	10.8	10.4	10.7
Chain price index	9.2	6.7	13.8	8.6	7.0	7.5	8.8	10.5	10.2	9.6
Fixed-weighted price index	9.2	6.7	12.9	8.7	7.2	7.8	9.2	10.4	9.9	9.8
Business capital—water:										
Current dollars	8.0	16.0	1.6	18.2	16.6	9.4	7.1	5.7	-3.9	-7.1
1972 dollars	-3	9.6	-18.0	2.5	8.1	1.8	-1.1	-4.2	-11.4	-15.7
Implicit price deflator	8.8	5.9	12.7	10.1	6.9	7.4	9.0	10.3	8.6	10.2
Chain price index	8.0	6.0	12.7	10.5	6.8	7.1	8.5	10.2	8.0	10.8
Fixed-weighted price index	8.3	6.0	12.3	10.4	7.5	7.4	8.7	10.8	9.9	10.9
Business current account, private—water:										
Current dollars	17.9	17.4	21.8	19.1	20.8	19.1	20.7	15.7	10.6	11.3
1972 dollars	6.0	10.9	7	3.5	11.9	9.2	12.8	6.5	-4.4	1.0
Implicit price deflator	11.2	6.4	20.1	15.1	9.0	9.1	7.2	9.6	16.6	10.2
Chain price index	11.0	6.3	20.2	15.1	7.6	8.8	6.9	8.5	16.8	10.8
Fixed-weighted price index	11.0	6.3	20.4	15.0	7.6	8.8	6.8	9.3	16.6	14.1
Pollution abatement and control—solid waste:										
Current dollars	13.8	8.2	16.8	8.4	11.5	10.8	18.4	18.8	14.8	18.5
1972 dollars	8.7	5	4.8	5	5.9	4.2	6.8	4.8	2.3	4.2
Implicit price deflator	8.2	7.8	11.9	7.5	5.0	5.8	6.1	18.9	12.1	8.0
Chain price index	8.2	7.8	12.8	7.5	4.9	5.8	6.2	18.8	12.1	9.1
Fixed-weighted price index	8.3	7.9	12.9	7.4	4.9	5.0	6.3	19.8	12.1	9.1

* Revised.

* Preliminary.

1. Compounded annually; not calculated for chain price index because it is defined for adjacent years only.

Pollution Abatement and Control in Current and Constant Dollars¹

1979 *					1980 *					1981 *					Line
Total	Air	Water	Solid waste	Other and unallocated	Total	Air	Water	Solid waste	Other and unallocated	Total	Air	Water	Solid waste	Other and unallocated	
current dollars															
5,096	81	4,898	48	77	5,241	86	5,027	63	74	4,936	88	4,691	88	68	1
4,797	(*)	4,784	7	6	4,989	(*)	4,918	9	8	4,582	(*)	4,478	26	90	2
281	78	93	88	33	249	80	94	42	24	278	85	108	89	25	3
71	7	21	3	29	64	5	23	3	23	25	(*)	11	4	18	4
(1972 dollars)															
2,914	48	2,794	36	46	2,778	45	2,882	29	41	2,349	43	2,349	46	32	5
2,784	(*)	2,723	4	8	2,698	(*)	2,599	6	4	2,219	(*)	2,198	12	12	6
187	68	56	19	19	184	42	54	28	18	136	45	61	80	13	7
48	6	12	2	24	86	8	13	2	18	16	(*)	8	3	7	8

equipment, which, in turn, led to upward revisions in nonmanufacturing air plus water PA current-account spending of \$0.1 billion in each year.

Real spending for air and water PA, 1972-81

Air and water PA, which accounts for most of PAC spending, is discussed in this section using classifications in Federal legislation (tables 6 and 7). For air PA, the Clean Air Act classifies sources of pollutants as mobile (e.g., cars) or stationary (e.g., factories). For water PA, the Federal Water Pollution Control Act classifies sources as point (e.g., factories) or nonpoint (e.g., highway construction projects).

Spending to reduce emissions of air pollutants from mobile and stationary sources combined increased at an average annual rate of 7 percent during 1972-81. Spending for mobile sources increased at an average rate of 14 percent; spending for stationary sources increased at a rate of 1 percent. Spending for emission abatement devices for mobile sources increased much faster than spending to operate the devices, 23½ percent compared with 5 percent (average annual increases).

Spending for air PA facilities for stationary sources was less in 1981 than in 1972. For the subperiod 1972-75, the average annual increase was 4½ percent, but for 1975-81 spending decreased. Annually, spending for facilities was volatile, with increases in 4 years and decreases in 5. Spending to operate these facilities increased steadily from 1975 to 1980 at an annual rate of 7 percent and decreased 1½ percent in 1981.

Water PA spending for point sources increased at an average annual rate of 1½ percent during 1972-81. Spending for water PA facilities for point sources was less in 1981 than in 1972. For 1972-75, the average annual increase was 7½ percent, but for 1975-81 spending decreased. Spending increased every year in the early period, but decreased in 4 out of 6 years in the later period. Spending to operate water PA facilities increased every year except 1980; the average increase for the period was 6 percent. Spending estimates for non-

point sources are of limited coverage, but indicate that spending decreased at an average annual rate of 6 percent during 1972-81.

Business PAC costs, 1972-81

One possible measure of the costs associated with PAC is the costs of conforming to PAC rules and regula-

tions.³ For business, such a measure would include, in addition to business current-account PA spending, a capital account PA spending.

3. Alternatively, business PAC costs are the amount by which business costs exceed what they would have been in the absence of PAC rules and regulations. In both formulations, regulations refer to legal requirements, and rules—written and unwritten—refer to additional expressions of community and business concern for PAC.

Table 6.—Constant-Dollar Spending for Abatement of Air Pollutant Emissions from Mobile and Stationary Sources¹

(Millions of constant (1972) dollars)

	1972	1973	1974	1975	1976	1977	1978*	1979*	1980*	1981*
Total	6,239	7,129	7,428	8,614	9,312	9,198	9,438	9,974	10,594	11,402
Mobile sources²	2,188	2,889	3,815	4,119	4,079	4,820	6,142	6,423	6,829	7,945
Devices	781	1,008	1,070	1,858	2,276	2,683	3,524	3,161	3,082	4,718
Cars.....	588	843	865	1,578	1,942	2,286	2,842	2,498	2,185	4,287
Catalytic.....	0	0	800	817	1,895	1,187	1,294	1,280	1,420	1,500
Noncatalytic.....	588	843	865	660	655	1,449	1,148	1,220	1,065	2,687
Trucks.....	118	166	205	273	265	347	672	662	687	491
Operation of devices	1,406	1,881	2,345	2,266	2,303	2,237	2,316	2,274	2,227	2,527
Cars.....	1,346	1,808	1,886	1,784	1,868	1,478	1,494	1,338	1,449	1,900
Trucks.....	147	206	269	481	435	759	918	1,046	1,178	1,626
Stationary sources	4,051	4,241	4,113	4,495	5,233	4,378	4,296	4,551	4,765	4,857
Facilities	2,623	2,864	2,827	2,987	3,741	3,577	3,132	2,548	2,709	2,408
Industrial.....	2,558	2,768	2,745	2,826	3,596	3,467	2,977	2,406	2,541	2,338
Manufacturing.....	1,145	1,433	1,408	1,440	1,884	1,866	1,168	1,177	1,086	1,500
Nonmanufacturing.....	1,413	1,335	1,337	1,386	1,712	1,601	1,223	1,319	1,455	1,238
Other³	68	75	86	71	192	121	116	144	156	149
Operation of facilities	1,406	1,377	1,286	1,508	1,592	1,398	1,501	1,500	1,548	1,919
Industrial.....	1,320	1,328	1,210	1,517	1,498	1,321	1,734	1,820	1,887	1,848
Manufacturing.....	772	748	696	786	869	942	960	1,018	1,006	1,001
Nonmanufacturing.....	548	580	520	731	629	379	744	811	882	847
Other³	79	69	76	91	94	87	77	89	82	79

* Revised.

* Preliminary.

1. The Clean Air Act classifies sources of pollutants as either mobile, such as passenger cars, or stationary, such as factories.

2. Excludes spending to reduce emissions from mobile sources other than cars and trucks; such spending was insignificant during 1975-81.

3. These estimates are from sources requiring updating; evidence suggesting less spending is accumulating.

4. Consists of spending for fixed capital of government enterprises such as the Tennessee Valley Authority.

5. Consists of spending to operate government enterprises and all spending by government; separate data on spending to acquire and operate government pollution abatement facilities are not available.

Table 7.—Constant-Dollar Spending for Abatement of Water Pollutant Emissions from Point Sources¹

(Millions of constant (1972) dollars)

	1972	1973	1974	1975	1976	1977	1978*	1979*	1980*	1981*
Total	7,681	8,314	8,535	9,289	9,916	9,923	10,313	10,641	9,875	8,441
Facilities	5,486	5,881	6,078	6,711	7,058	6,845	7,421	7,182	6,480	5,144
Industrial	1,411	1,506	1,596	1,945	2,188	2,060	1,928	1,809	1,698	1,425
Manufacturing.....	826	838	852	999	1,178	1,164	601	725	615	485
Nonmanufacturing.....	785	745	744	947	964	896	1,127	1,084	1,083	940
Public sewer systems, private connections to them, and other	4,075	4,345	4,482	4,765	4,869	4,785	5,493	5,373	4,782	3,719
Public sewer systems and private connections.....	4,036	4,198	4,418	4,717	4,806	4,723	5,499	5,285	4,736	3,697
Other ³	82	64	64	48	64	62	84	88	46	22
Operation of facilities	2,115	2,384	2,457	2,578	2,816	3,077	3,492	3,459	3,441	3,600
Industrial	912	1,021	1,038	1,002	1,218	1,397	1,526	1,517	1,531	1,544
Manufacturing.....	591	655	648	671	700	843	892	838	854	831
Nonmanufacturing.....	321	366	376	332	458	494	638	679	647	653
Public sewer systems, private connections to them, and other	1,203	1,363	1,419	1,576	1,598	1,740	1,977	1,942	1,910	1,956
Public sewer systems and private connections.....	1,134	1,284	1,384	1,504	1,413	1,612	1,871	1,743	1,796	1,831
Other ³	79	129	171	228	186	198	206	198	124	126

* Revised.

* Preliminary.

1. The Federal Water Pollution Control Act defines point sources as facilities that discharge to a body of water through a pipe or ditch.

2. Consists of spending by owners of facilities and spending for fixed capital of government enterprises such as the Tennessee Valley Authority.

3. Consists of spending to operate government enterprises and all spending by government; separate data on spending to acquire and operate government pollution abatement facilities are not available.

tal consumption allowance, a net imputed return for PA capital, and research and development spending.⁴ Estimates of business PAC costs have been prepared for 1972-81 (table 8).⁵ Business PAC costs in current dollars increased at an average annual rate of 17½ percent during 1972-81. The two major components, "costs of PAC-induced modifications in final products" and "costs of business PAC of its own wastes," increased at average rates of 20½ percent and 16½ percent,

4. Net imputed return is what businesses would have earned if capital used for PA had been used for purposes other than PA (i.e., what businesses forego when they use capital for PA); it is estimated as the PA net capital stock multiplied by the ratio of nonlabor earnings to assets for nonfarm corporate business.

5. Information on sources and methods used in these estimates will be provided upon request. Send requests to U.S. Department of Commerce, Bureau of Economic Analysis, BE-62, Washington, D.C. 20230.

respectively. The addition of emission abatement devices to motor vehicles is an example of the former kind of costs, and the use of electricity to operate the wastewater treatment works of a manufacturing operation is an example of the latter.

What is generated by business PAC costs, although not a final demand in the framework of the national income and product accounts (NIPA's), has characteristics of a final demand: the clean air and water they generate are products, albeit unconventional ones, for consumption, and are not inputs to further production. Further, business PAC costs, although not a tax, have characteristics of a tax: (1) they are not used to benefit the businesses directly affected, but rather to purchase resources used for collective consumption, and (2) the costs may be

shifted forward or backward as markets allow. For some types of analysis, users of the NIPA's may want to consider the provision of clean air and water as collective consumption and the tax characteristics of business PAC costs. Doing so may improve the internal logic of the study and suggest useful interpretations of results. To date, resource absorption has been considered systematically only for those cost components classified as final demand in the NIPA's; specifically, economic growth models have excluded PA capital but not labor and materials. The tax characteristics of business PAC costs as a whole have not been considered, although two aspects have been: business PA as affecting relative prices, and business PA capital as reducing the rate of return.

Table 8.—Business Pollution Abatement and Control (PAC) Costs in Current Dollars¹

	(Millions of dollars)									
	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981
Business PAC costs.....	12,887	15,819	18,575	20,685	25,819	28,282	35,907	40,845	46,006	53,884
Costs of PAC-induced modifications in final products.....	2,023	2,551	2,432	3,396	4,336	5,348	6,408	7,542	8,562	10,945
Residential systems ²	1,240	1,488	1,288	1,863	1,259	1,575	1,873	2,067	1,780	1,684
Motor vehicles ³	783	1,063	1,144	1,533	3,077	3,773	4,535	5,475	6,782	9,261
Adjustment to market price valuation ⁴	88	74	19	88	128	137	155	178	221	285
Costs of business PAC of its own wastes ⁵	10,784	13,268	16,143	17,289	21,483	22,934	29,499	33,303	37,444	42,939
Residential business.....	4,519	4,700	4,488	5,261	6,153	7,180	7,912	8,058	8,006	8,955
Current costs.....	185	211	229	247	262	282	316	387	389	383
Capital costs ⁶	4,001	4,259	4,049	4,747	5,878	6,542	7,227	7,245	7,242	8,104
Capital consumption allowance.....	540	582	673	786	882	936	1,045	1,179	1,308	1,441
Net imputed return ⁷	2,841	3,999	3,306	3,117	3,782	4,610	5,214	5,199	4,948	5,614
Adjustment to a market price valuation ⁴	388	380	319	287	308	345	371	374	405	479
Nonfarm nonresidential business.....	6,265	7,768	8,386	13,238	15,081	18,277	21,582	25,245	29,437	38,988
Current costs.....	2,799	3,341	4,317	5,679	6,799	7,980	9,597	11,879	14,735	18,717
Motor vehicles.....	435	610	1,050	1,234	1,482	1,529	1,912	2,640	3,804	4,523
Air and water pollution abatement, except motor vehicles.....	2,620	3,013	3,799	4,312	5,356	6,441	7,665	9,130	10,656	11,767
Solid waste pollution abatement.....	162	128	495	586	799	845	1,005	1,490	1,885	2,224
Costs recovered.....	-428	-470	-538	-693	-887	-965	-1,075	-1,560	-1,610	-1,788
Capital costs ⁶	3,043	3,943	4,506	5,945	7,459	9,319	10,999	12,141	13,321	15,549
Capital consumption allowance.....	388	1,364	1,788	2,218	2,804	3,388	4,089	4,885	5,863	7,018
Motor vehicles.....	46	70	107	155	250	358	480	646	862	1,101
Air and water pollution abatement, except motor vehicles.....	304	1,120	1,607	2,874	2,505	3,972	3,470	4,118	4,547	5,709
Solid waste pollution abatement.....	8	14	24	37	49	66	89	120	153	209
Net imputed return ⁷	1,611	2,080	2,081	2,739	3,583	4,678	5,558	5,767	5,789	6,810
Motor vehicles.....	32	50	55	91	146	219	283	338	381	462
Air and water pollution abatement, except motor vehicles.....	1,609	3,013	2,002	2,613	3,388	4,399	5,175	5,328	5,384	6,185
Solid waste pollution abatement.....	10	17	32	35	49	71	95	110	124	160
Research and development for pollution abatement.....	184	182	225	281	281	354	375	438	486	414
Adjustment to a market price valuation ⁴	250	233	350	452	541	624	710	795	976	1,198
Additional:										
Net imputed return adjustment ⁸	381	487	1,391	1,384	1,145	722	655	1,484	2,267	2,343
Residential business.....	318	342	1,111	1,216	1,085	781	699	1,658	2,769	2,841

1. Derived from tables 1 and 2, detail underlying these tables, related national income and product account data, and capital stocks for pollution abatement. Information on sources and methods used in these estimates will be provided upon request.

2. Consists of the construction of private septic systems and sewer connections linking household plumbing to street sewers.

3. Consists of motor vehicle emission abatement systems and the added consumer expense of purchasing unleaded rather than leaded fuel.

4. Consists of sales-associated charges, part of indirect business taxes (those contingent upon sales), business transfer payments (made out of sales revenue), and the statistical discrepancy. These charges are measured as what they would have been if resources used for pollution abate-

ment had been used to produce final product. Business PAC costs are adjusted to market prices to make them comparable to other values at constant prices.

5. Consists of the costs of a business' abatement of its own waste (self service), one business' abatement of another business' waste, and related research and development.

6. Includes items not shown separately, insurance and taxes on pollution abatement capital.

7. Consists of the pollution abatement net capital stock multiplied by the ratio of nonlabor earnings to assets for nonfarm corporate business and measures what businesses would have earned if capital used for pollution abatement had been used to produce final product.

8. The amount shown may be added to the net imputed return when a breasted rather than an unbreasted earnings-to-asset ratio is required.